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CHARACTERIZATION TEST PROGRAM, JANTX DIODE
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JAN TRANSISTOR AND DIODE CHARACTERIZATION TEST PROGRAM

FINAL REPORT
FOR
JANTX DIODE
1N5619

FEBRUARY 1977
Prepared
for

GEORGE C. MARSHALL SPACE FLIGHT CENTER
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Marshall Space Flight Center, Alabama 35812

MSFC/NASA CONTRACT No. NAS3-31944

by
HIRO TAKEDA

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DCA RELIABILITY LABORATORY

FORWARD

This report is a statistical summary of the electrical characterization performed on NASA Contract NA8-31944. This is one of a group of thirty-nine (39) such reports prepared on selected JAN and JANTX Transistors and Diodes for the George C. Marshall Space Flight Center, Huntsville, Alabama. The Contracting Officer's Technical Representative was Mr. Howard B. Meeks.

This work was performed by DCA Reliability Laboratory, Special Products Division, Sunnyvale, California under the management of Mr. Robert Starr with the special assistance of Mr. Barry Lorenzo, Mr. Kenneth Radford and Mr. Hiroharu Takeda.

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1.0 INTRODUCTION

The objective of this characterization program is to provide the necessary data to create a new class of 19500 detail specifications "JAN A CLASS".

1.1 SAMPLE SELECTION

Sample selection was made according to the following criteria:

1. Manufacturer or qualified distributor.
2. Two vendors.
3. Two date codes.

1.2 PROCUREMENT GUIDELINES

The general guidelines for procurement were:

1. Two QPL vendors
2. JAN or JANTX
3. Two (2) manufacturing lots (Date Codes), twenty-seven (27) from each lot.

2.0 TECHNICAL SUMMARY

The devices used in this report were JANTX 1N5619 Silicon Diodes manufactured by Micro Semiconductor and Semtech.

All data was acquired with three (3) digit accuracy. The data processing and calculation of statistical parameters was performed by the Tektronix S-3260 computer system using four (4) digit display.

2.1 TEST PARAMETERS AND CONDITIONS

$$2.1.1 \quad I_R \quad V_R = (\text{Max. Rated } V_R) = 600V \quad T_A = 25^{\circ}\text{C} \text{ \& } 150^{\circ}\text{C}$$

$$2.1.2 \quad V_{F1} \quad I_F = (10\% \text{ of Rated } I_F) = 300\text{mA} \quad T_A = 25^{\circ}\text{C} \text{ \& } -65^{\circ}\text{C}$$

$$2.1.3 \quad V_{F2} \quad I_F = (50\% \text{ of Rated } I_F) = 1.5\text{mA} \quad T_A = 25^{\circ}\text{C} \text{ \& } -65^{\circ}\text{C}$$

$$2.1.4 \quad V_{F3} \quad I_F = (100\% \text{ of Rated } I_F) = 3.0\text{mA} \quad T_A = 25^{\circ}\text{C} \text{ \& } -65^{\circ}\text{C}$$

$$2.1.5 \quad C_{o1} \quad V_R = 0V \quad F = 100\text{KHZ} \quad T_A = 25^{\circ}\text{C}$$

$$2.1.6 \quad C_{o2} \quad V_R = 0V \quad F = 1\text{MHZ} \quad T_A = 25^{\circ}\text{C}$$

$$2.1.7 \quad t_{rr} \quad T_A = 25^{\circ}\text{C}$$

2.2 UNIT DEFINITIONS

NAME	SYMBOL	MULTIPLIER
Kilo	K	10^3
Milli	M	10^{-3}
Micro	U	10^{-6}
Nano	N	10^{-9}
Pico	P	10^{-12}

Example using a statistical summary section:

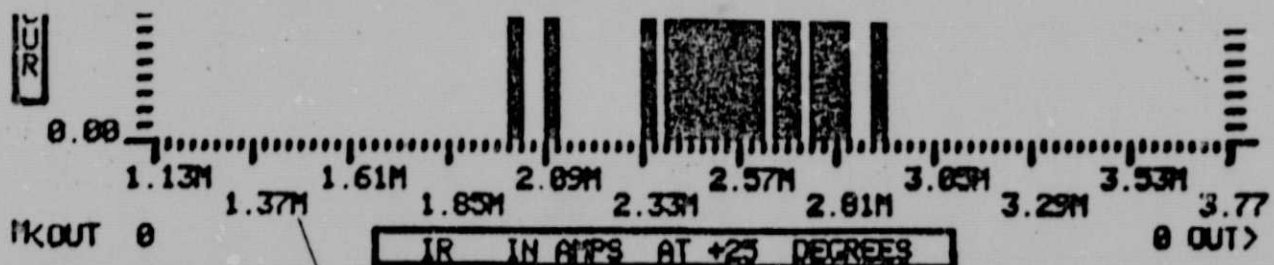
IR IN AMPS AT 25 DEGREES
AT VR=2.64 VOLTS

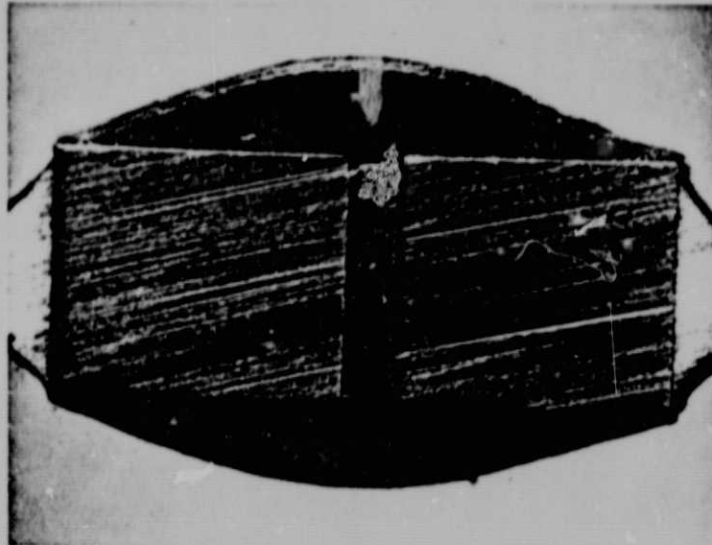
MD10/ 7603	2.534M	218.7U	2.010M	2.090M	2.780M
MD10/ 7550	2.423M	276.9U	2.010M	2.030M	2.780M
SIEM/ 7508	2.997M	426.5U	1.820M	2.490M	3.480M

Milli

Micro

Example using a histogram:





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FIGURE 1

Device Number: IN5619
27 Diameters
D/C 7631

Typical Overall Cross-
Sectional View
MFR: Semtech S/N EO27681

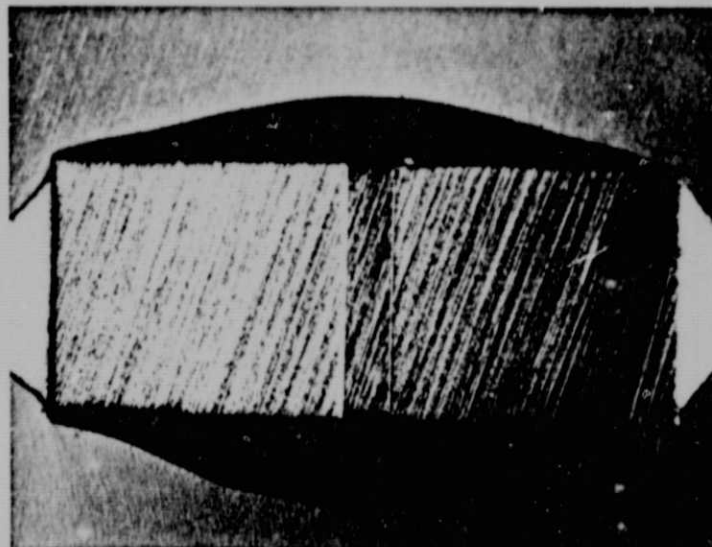


FIGURE 2

Device Number: IN5619
27 Diameters
D/C 7531

Typical Overall Cross-
Sectional View
MFR: Semtech S/N EO27708

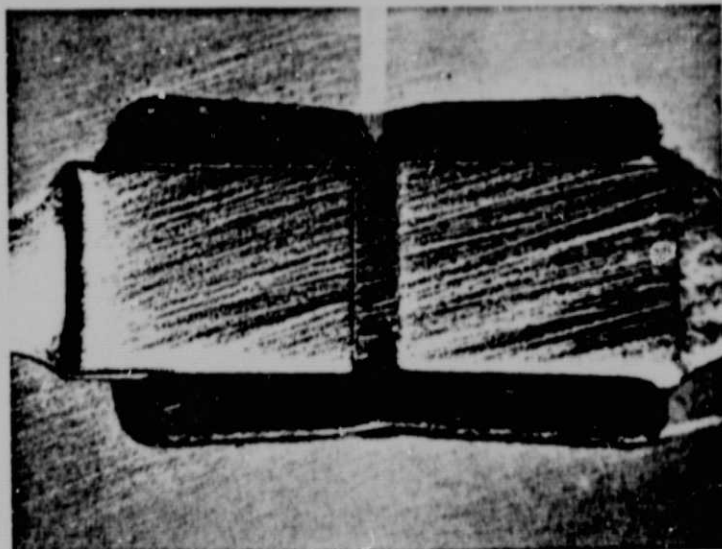


FIGURE 3

Device Number: IN5619
27 Diameters
D/C 7633

MFR: MSC

Typical Overall Cross-
Sectional View
S/N EO27736

3.0 STATISTICAL SUMMARY

The Statistical Summary, pages 3-2 to 3-4, are a consolidated presentation of the data acquired formatted for easy Vendor to Vendor and date code to date code analysis. Each parameter is presented with Test Conditions, Mean, Standard Deviation, Lowest Reading, 10% Point (where 10% of all readings are equal to or less than the indicated reading), 90% Point (where 90% of all readings are equal to or less than indicated reading) and the Highest Reading.

It should be noted the Mean presented in the summary may vary slightly from that presented on the histograms due to a slight variation in the data base used for calculation.

EXAMPLE:

Semtech: I_R $V_R = 600V$ $T_A = 25^{\circ}C$

Summary: MEAN 65.43nA

Histogram: MEAN 65.59nA

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PART NUMBER : 1N5619

VENDOR : MICRO SEMICON

DATE CODE : 7633

VENDOR : SEMTECH

DATE CODE : 7631

VENDOR : SEMTECH

DATE CODE : 7531

VEND / DC	MEAN	STD. DEV.	LOW PT	10% PT	90% PT	HIGH PT.
-----------	------	-----------	--------	--------	--------	----------

IR IN AMPS AT 25 DEGREES
AT VR=600 VOLTS

MSI / 7633	345.3N	1.040U	96.00N	111.0N	236.0N	300.0N
SEMT / 7631	65.43N	29.59N	26.80N	29.90N	98.00N	156.0N
SEMT / 7531	75.94N	52.61N	23.80N	28.10N	129.0N	229.0N

IR IN AMPS AT 150 DEGREES
AT VR=600 VOLTS

MSI / 7633	255.5U	73.37U	96.10U	150.0U	339.0U	476.0U
SEMT / 7631	91.26U	33.30U	30.10U	52.90U	130.0U	196.0U
SEMT / 7531	228.4U	56.03U	128.0U	131.0U	269.0U	351.0U

VF1 IN VOLTS AT 25 DEGREES
AT IF=300 MA

MSI / 7633	959.4M	35.51M	899.0M	912.0M	987.0M	1.070
SEMT / 7631	821.8M	9.555M	798.0M	804.0M	833.0M	838.0M
SEMT / 7531	828.0M	12.53M	804.0M	806.0M	842.0M	854.0M

DCA RELIABILITY LABORATORY

PART NUMBER :1N5619

VEND / DC	MEAN	STD. DEV.	LOW PT	10% PT	90% PT	HIGH PT.
-----------	------	-----------	--------	--------	--------	----------

VF1 IN VOLTS AT -65 DEGREES
AT IF=300 MA

MS1 / 7633	1.054	30.91M	990.0M	999.0M	1.080	1.130
SEMT/ 7631	966.6M	14.79M	947.0M	951.0M	973.0M	1.030
SEMT/ 7531	967.8M	21.56M	942.0M	948.0M	979.0M	1.050

VF2 IN VOLTS AT 25 DEGREES
AT IF=1.5 AMPS

MS1 / 7633	1.208	53.12M	1.110	1.130	1.260	1.350
SEMT/ 7631	1.031	29.13M	963.0M	972.0M	1.060	1.060
SEMT/ 7531	1.052	50.54M	974.0M	988.0M	1.100	1.190

VF2 IN VOLTS AT -65 DEGREES
AT IF=1.5 AMPS

MS1 / 7633	1.267	52.86M	1.170	1.200	1.330	1.430
SEMT/ 7631	1.179	47.07M	1.110	1.110	1.210	1.360
SEMT/ 7531	1.190	56.92M	1.110	1.120	1.260	1.340

VF3 IN VOLTS AT 25 DEGREES
AT IF=3.0 AMPS

MS1 / 7633	1.359	69.92M	1.230	1.260	1.430	1.540
SEMT/ 7631	1.189	30.06M	1.100	1.120	1.220	1.230
SEMT/ 7531	1.224	75.89M	1.120	1.140	1.300	1.470

DCA RELIABILITY LABORATORY

PART NUMBER :1N5619

VEND / DC	MEAN	STD. DEV.	LOW PT	10% PT	90% PT	HIGH PT.
-----------	------	-----------	--------	--------	--------	----------

VF3 IN VOLTS AT -65 DEGREES
AT IF=3.0 AMPS

MSI /	7633	1.429	65.55M	1.290	1.340	1.500	1.580
SEMT/	7631	1.350	56.32M	1.250	1.270	1.400	1.530
SEMT/	7531	1.379	97.54M	1.230	1.280	1.460	1.650

CO1 FARADS AT 25 DEGREES
AT 100 KHZ AND VR=0 VOLTS

MSI /	7633	9.554P	3.313P	6.100P	6.400P	13.40P	18.40P
SEMT/	7631	60.61P	5.680P	38.96P	55.86P	65.86P	69.09P
SEMT/	7531	61.71P	2.549P	58.14P	58.20P	65.13P	67.40P

CO2 FARADS AT 25 DEGREES
AT 100 KHZ AND VR=0 VOLTS

MSI /	7633	6.500P	1.820P	3.900P	4.400P	9.000P	11.50P
SEMT/	7631	56.48P	3.002P	50.60P	53.00P	60.12P	62.39P
SEMT/	7531	58.00P	2.849P	54.32P	54.38P	61.00P	66.48P

TFR IN SEC.S AT 25 DEGREES

MSI /	7633	123.8N	9.034N	110.0N	115.0N	135.0N	145.0N
SEMT/	7631	203.6N	32.80N	115.0N	160.0N	250.0N	250.0N
SEMT/	7531	187.4N	22.28N	150.0N	160.0N	210.0N	245.0N